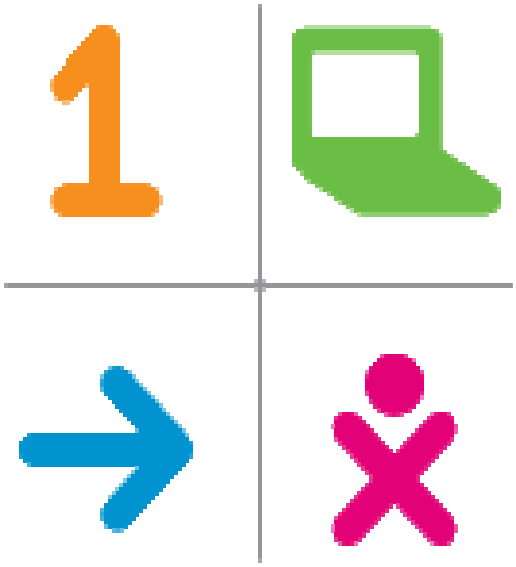
One Laptop per Child



Deployment Guide

for administrators, educators and project managers

SEE: http://wiki.laptop.org/go/Deployment_Guide

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NOTE: All hyperlinks lead to the OLPC Wiki

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One Laptop per Child Association

One Laptop per Child (OLPC) Deployment Guide

This is a generalized guide to a large-scale deployment of One Laptop per Child. It is a working document that reflects lessons learned from our initial pilots and deployments. Additional ideas will be incorporated as we learn from each other.

Please also check out the Deployment Resources for reports, links, documentation and other resources collated by deployment teams all around the world.

Every deployment includes planning (pre-deployment), execution (deployment), and support (post-deployment). Topics that need to be considered in detail in any deployment include:

1. Consultation
2. Core Team
3. Logistics
4. Localization
5. Connectivity
6. Power Infrastructure
7. School Server
8. Teacher Preparation/Student Facilitation
9. Support
10. Service/Repairs
11. Internet-safety Training
12. End-of-life Planning

Each of these topics is expanded upon in this wiki. Also in the wiki are: (I) some tips based upon our experience in trial deployments around the world; (II) a deployment checklist; (III) a sample deployment deployment schedule; (IV) a sample workshop schedule; (V) a glossary of terms; (VI) a worksheet for planning deployment needs on an individual school basis; and (VII) a guide to imaging, activating, and registering laptops.

A workbook for estimating deployment power consumption and expenses is available, along with the presentations and materials from the Deployment planning workshops held at OLPC's Boston, MA headquarters for visitors who come in to plan their large country-wide rollouts.

Next Section: Consultation

1. Consultation

In any OLPC deployment you need have strongly consultation with the school and community you are deploying to well in advance of any actual hardware or technical planning. Use some XOs to demonstrate the capability (make sure you demonstrate the connectivity and collaboration as well as individual activities), and get the school onside.

Make sure you have at the very least:

- The school Principal
- The teacher(s) who will have the classrooms of children with XOs

You'd also gain benefits by including:

- The appropriate department of education if possible. At least let them know about it if nothing else as their support would make a national difference in some cases.
- Parent/community support - you could hold an open meeting for the community to talk about OLPC and it's impacts before doing anything to demonstrate to them, answer their questions and concerns, and also to gain their buy-in and support for the children.

Ensure that you have clear knowledge of (or get clear knowledge of) the cultural implications of an XO rollout, and that you ensure appropriate expectations are set for the community and teachers who will be involved.

Also ensure that the planning of your deployment includes clear documentation and knowledge transfer for the local people, and that there is some form of support. You could use the OLPC support or even create your own if you need to.

Next Section: Core Team

2. Core Team

The key OLPC stakeholders include the learning team, the hardware team, the software team, server-/connectivity-infrastructure team, the power-infrastructure team, the finance team, the operations and logistics partners, and the manufacturer, suppliers, etc.

The in-country stakeholders include government representatives, sponsors, supporters, deployers, implementers, power infrastructure specialist, suppliers, deliverers, storage provider, and recipients, e.g., school officials, teachers, children, and the community.

The core country team must include technical, pedagogical, logistics, and political (i.e. ministry of education) leads. The technical lead takes responsibility for the software, hardware, and communication and power infrastructures. The pedagogical lead takes

responsibility for teacher preparation, content, and evaluation. The logistics lead takes responsibility for shipping, distribution, security, activation and repairs. The political lead is responsible for fighting the inevitable battles of will that will arise. Other team members include a liaison to OLPC, a liaison to the community, an independent evaluation team, university liaison, a diaspora liaison, and a local volunteer liaison.

It is important to understand that OLPC does not have the resources to have substantial direct involvement with deployments. It is therefore up to the country to establish and train a capable team to fill the above roles. OLPC will assist by providing training resources (such as this guide) and private tech support to large deployments.

Other roles that are expected to be carried out by the in-country team include:

- Digitization and collection of educational content
- Customization of the OS with activities and content
- Continued testing of the keyboard
- Localization (including translation)
- Community outreach
- Communicating back to the community (share your experiences!)
- Involvement with ongoing software development, to ensure that translations, keyboards and activities continue to work

The above topics are covered in detail in later sections of this deployment guide.

Next Section: Logistics

3. Logistics

Lead time: Many components of a deployment have relatively immutable lead times. These lead times must be taken into consideration when developing a deployment schedule. For example, in order to minimize supply-chain costs, OLPC is required to give the factory a three-month lead time on all orders. Other long lead-time items include: new keyboards—approximately two months after the design is complete; factory QA of new software—approximately two weeks; shipping—typically one month by sea; etc. A new power adapter might take up to 6 months, since it involves industrial design, tooling, and safety certification. Some of these lead-times can be run in parallel, e.g., a keyboard can be designed during the three-month manufacturing lead time for laptops. Others are by their nature serial, e.g., obviously shipping must follow manufacturing.

Logistics includes everything from delivery of the laptops in country to their distribution to the children and teachers. Laptops can be delivered ex works, in which case the laptops are available for pickup at the door of the factory in China, or delivered through our partner Brightstar, who can manage/coordinate all aspects of logistics, including transportation to the destination country, through customs, to regional distribution centers, or even, in some cases, all the way to the school, while taking into consideration customs and import duties,

insurance, etc. Depending upon the country or region, another partner, the United Nations Development Program (UNDP), may also play a role. OLPC will be happy to help with this planning process, but the ultimate decision-making and responsibility lies with the organization doing the deployment, be it a ministry of education or a non-governmental organization, such as an educational foundation.

Things to be considered:

- How will the laptops be shipped: by sea, by air (this is expensive, but sometimes considered as a means to shorten the time it takes to first get laptops into deployment)?
- How will customs be handled?
- Have all of the safety certifications been applied for and obtained? (OLPC will work closely with you in regard to any special certifications needed in your country.)

- How will the inventory be managed once it is in country? (An inventory list that correlates individual laptops with individual schools is required by our anti-theft system. Someone on the country deployment team needs to be appointed by the country team to be trained by OLPC in the use of our "Activation Key" generation system.)
- What are the school selection criteria?
- How will the laptops be distributed regionally? (The Activation Keys must be delivered through a separate, "trusted" channel.)
- How will the laptops get from the regional distribution centers to the schools?

- Where will spare parts be inventoried? How will they be managed? (Note that 1% extra units are included in your order as the means of warranting the laptop. A plan is necessary for where these units will be stocked and how they will be distributed. Please consider that the laptop is designed such that most service can be done by the children themselves—empower them!)

- What is the policy regarding activation leases? What is policy regarding laptop replacement? etc.
- What is the policy regarding taking the laptops home? Keeping the laptops over the summer? etc.

The distribution of laptops, of course, requires a detailed plan: how many laptops to which schools in which order.

Note that because of the lead-times involved, the software image in the laptops arriving in country could be up to four-to-five months old. It is very likely that in the early stages of deployment, more current, localized software and content will be required. Where this software is loaded onto the laptops and by whom is an important consideration.

A further consideration is software and content updates. While these can be automated by the OLPC build system, in most cases it is something that should be gated by the in-country team, e.g., software development doesn't necessarily follow the academic calendar—it may

make sense to do updates during vacation times. Also to be considered is the mechanism by which updates are delivered. Network bandwidth is often a limited and expensive resource. Pushing updates out or delivering them on physical media, e.g., USB memory sticks, is something to discuss with OLPC. (Caution: while most USB memory sticks are compatible with the laptop, please be sure to test them before making a bulk purchase.)

In regard to scheduling and resource allocation, note that software updates and activation are largely autonomous actions: e.g., you can upgrade/customize the software on the laptop in the warehouse prior to activating them. Activation can happen in the field, when the laptops are distributed to the children. (Note that after reflashing a laptop—which involves overwriting the entire image rather than upgrading a portion of it—it will need to be reactivated.) There are procedural details about reimaging, activating, and registering laptops in Appendix VII.

Next Section: Localization

4. Localization

Almost every aspect of the one laptop per child system is amenable to localization and customization. The list below highlights features that can be customized, along with examples of such from our experiences in the field.

Keyboards

OLPC offers a range of regional keyboards, with the option of creating new ones if required for new deployments.

Keyboard requirements vary wildly by region. For example:

- A single combined English and Amharic keyboard is supplied to Ethiopia, Amharic being the only Ethiopic language supported at this time.
- For both Nigeria and Afghanistan, OLPC has designed keyboards to support with multiple major language groups.
- In other regions such as the Indian subcontinent, supporting all major language groups through one keyboard is impractical; multiple keyboards will be required to give broad coverage.

Check the Keyboard category to see if there is already a keyboard design that would suit your deployment. If not, you need to submit your own design.

Translation

OLPC encourages translation as a community sport, and operates a Pootle Server to coordinate such efforts.

As the in-country team, it is up to *you* to establish satisfactory translations of OLPC's operating system and activities. Here are the steps you should take:

1. Contact OLPC to get your language set up on Pootle, if it is not there already
2. Establish a team of translators to translate the operating system and selected activities
3. Perform the translation, regularly testing progress
4. Finalize the translation and establish some kind of sign-off on the final results
5. Arrange for your translation to be included in a specific OS build, or deploy using language packs

There are various translation-related articles scattered throughout the wiki, including:

- Localization
- Pootle
- Pootle/FAQ
- XO_l10n

Unfortunately, the quality, correctness and present-day relevance of these articles varies significantly (we would appreciate help reorganising this content). In the mean time, we recommend the following resources to learn how perform translations:

- Sayamindu Daspaguta's excellent OLPC Pootle visual walkthrough
- BengaLinux translator's guide (provides some insight into various translation considerations)
- Pootle/FAQ (this wiki page is kept the most current of all the articles on the wiki)

Other considerations

- Content, including texts, dictionaries, documentation, etc. can all be localized. OLPC maintains a wiki (a community-editable website) with numerous materials, guides, etc. that may already be translated. Also, the various in-country deployment teams have prepared materials that they are generally willing to share. Please ask OLPC for pointers to potentially useful materials.
    - Some materials will necessarily need to be localized in country. For example, Linux currently has no spelling dictionary for Igbo. Not to be deterred, the children at the Galadima school in Abuja wrote one themselves. One sub-goal of OLPC is self-sufficiency—localization is by definition a local problem—the open nature of our system enables community involvement and ownership.
    - The voice model used by the laptop's speech synthesizer supports approximately 50 languages; developing new models is somewhat tedious, but may be worth the investment, as text-to-speech is a useful tool for both learning to read and accessibility.
- The base software system distributed on the laptop can also be customized to some extent. OLPC has developed a mechanism where by the collection of “activities” and content “bundles” loaded onto the laptop can be readily pre-configured. It is also reasonably easy to reconfigure in the field. It is the responsibility of the in-country

deployment team to determine which activities beyond the core set distributed by OLPC should be included on the laptop. While OLPC does QA on the core activities, it is advised that in-country QA be done on any additional activities to be bundled with the base system. (Most activities are developed by volunteers from the open source community—the translations and the activities themselves must be tested in country as part of your evaluation as to what to activities to ship with the laptops.) Electronic books—PDF, DOC, HTML, etc.—and other media can be pre-loaded onto the laptop as a content bundle. Please consult with OLPC regarding pre-loaded content preparation.

- Reverse Localization is another important concept. Many sites build web-pages to describe their experiences in their local language. These pages can provide important feedback to OLPC and other deployments, but only if the language barrier can be lowered. There are some easy steps that can be taken to make such pages as accessible as possible to other language communities, which makes them even more valuable.

Next Section: Connectivity

5. Internet Connectivity

Although the OLPC ecosystem provides a self-configuring local-area wireless network for a small implementation, connectivity to the Internet is something that needs to be worked out in detail in country. OLPC will assist in the planning and integration of the laptop network to a national infrastructure. We have experience with VSAT, DSL, etc. that we are happy to share. Many of the in-country teams have even more experience than we do, especially in regard to rural deployments. Sharing best practices is in all of our interests. As with the laptop deployment, connectivity will not happen everywhere at once. A phased deployment that runs ahead of the laptop deployment is ideal. Please note that the wireless mesh network provides local “Ethernet”-like connectivity without any additional infrastructure.

Next Section: Power Infrastructure

6. Power

The OLPC laptop is the most power-efficient laptop ever built, but it still needs a source of electrical power. In ebook mode, it runs at less than 2 Watts. Average power consumption is approximately 5 Watts.

We have been working with a number of alternative power systems, including solar, human-power, etc. Currently we have 5-, 7-, and 10-Watt solar-panel solutions that are quite attractive for individual laptops (5 Watts is a supplement for extending the battery life while out in the sun); we are also developing a solar-panel multi-battery classroom charger—a small number of prototype units will be available soon. We have still not achieved our goal of a cost-effective school server that can be powered off of the grid. Please take this into consideration when doing your site preparation. Another consideration is energy storage: if

you need to run when the sun does not shine, you'll need a battery system for the school and ample power to both charge the battery and run the school server at the same time.

The following worksheet can be used to estimate the power requirements for each school. (The Watt-hours are dependent on how long the children are in school, whether or not they are charging their batteries while they are working, and how many hours per day the school server and connectivity are operational.)

	Number of units	**avg. Watts**	**Total power required**
Laptops	100	5 (15 peak)	500 Watts
School Server	1	20 (24 peak)	20 Watts
Connectivity (e.g., Vsat modem)	1	50	50 Watts
		Total Power	570 Watts

The total energy required to operate 100 laptops and a school server over an eight-hour period is approximately 570 Watts times 8 hours or 4560 Watt-hours. If, for example, you wanted to generate and store this energy over the course of a two-hour period, you'd need roughly 11400 Watts generation capacity feeding a battery system with adequate storage capacity, assuming 80% efficiency. (As a datapoint, Wikipedia gives the lead-acid battery a 70-92% efficiency.)

(An additional consideration is the means to provide power to individual laptops in the classroom. Due to physical-design constraints, our power adapters are oriented to be used with power strips that have sockets are oriented parallel to the length of the strip, e.g., = = = =. Power strips with a perpendicular orientation, e.g., || || || ||, are inefficient as adapters cannot take advantage of every outlet. At least one manufacturer is developing a system that directly incorporates the power supply for up to eight laptops in a single unit, eliminating the need for individual power adapters. This is still in early prototype stage, but it looks promising.)

Some questions you should consider if you are planning to make extensive use of solar energy:

- Is this a no power grid environment? Is solar the only power source?
- How much sun will the deployment area have? How long and often do you have clouds and rain? How long during the day do you have bright, strong, hot sunshine?
- Do you have any data on the average daily solar irradiance?
- Do you require a school server (or other equipment) that has to be solar powered in addition to the laptops?
- What is the physical set up of the places where the laptops will be used? Will it be indoors or somewhere sun is available?
- How many of the laptops will be in use simultaneously (per site) and how many need to be recharged at any one time?

- What is the planned usage pattern during the day? Will they be taken home and used so that in the mornings the battery is drained or low?

The 10W panel at full output will fully charge a drained battery in just under three hours if the laptop is turned off; if you can take advantage of the peak solar hours (11:00 to 14:00), then you should be able to keep the laptops charged, but this means not using them during that period.

If the laptop is running, then full sun with the 10W panel will provide enough average power to run the laptop and slowly charge the battery (about six hours). If you don't have full sun, then you will break even or slowly drain the battery.

Additional tools/references

- POWERING ICT - An Energy Solutions Toolkit for ICT Projects was developed by the Academy for Educational Development under the dot-ORG program, under a USAID Cooperative Agreement. http://www.dot-com-alliance.org/POWERING_ICT/

Next Section: School Server

7. School Server

Part of our deployment model is to utilize school servers. A School server is designed to provide a gateway to the Internet, a local content repository, back-up, school management, etc. As important as all of these services, their most critical role is to scale the local-area network. (Without the schoolserver, the XO laptops use multicast to communicate with each other which puts a heavy load on the network. The school server eliminates the need for much of the multicast traffic). Without a school server, the largest network that can be maintained is approximately 20 laptops. Each school server can maintain a network of approximately 120 laptops, so in environments with more devices you can put in place multiple schoolservers.

Some key benefits a schoolserver brings to your deployment are:

- The OLPC Server is a software stack that can be installed on any reasonable PC or server to complement the XO and help school environments provide a safe, well managed and learning oriented environment
- Backup – The XOs can all backup to the OLPC Server to ensure content isn't lost. All the XO Journals are backed up to the schoolserver and teachers can view the Journals to provide some oversight and safety in how the XOs are being used.
- Digital Library – A Digital Library makes it easy for students to publish works (with teacher moderation) to other students and possibly to other schools. Teachers can easily add new resources to the Digital Library that students can access at school

- Teaching – The OLPC Server software provides an easy way to deliver customised classes through an eLearning system which the kids browse to through the network. Namely Moodle.
- Management and security - The schoolserver can manage who can connect to the network, can lock laptops that get stolen or who don't come to school, can provide a local software repository for laptop updates and more.
- Proxy server - The OLPC Server software can act as a proxy for secure web browsing by the XOs and can also be used for security and management of the software and XOs, including management of bandwidth and software releases.
- There are also additional functionalities coming in the school server, including Video conferencing, GPS and GIS functionality, Voice over IP, Instant messaging, and News services (blogging, forums, etc. As an Open Source platform you could always modify the schoolserver to suit your particular needs.

- The school server can unify up to three separate mesh channels.

We are working towards allowing a laptop to serve the role of the School Server for small schools; but that goal has not been reached yet and so it is not currently an option. Your schoolserver should be a basic PC and the specifications and instructions for setting up a schoolserver is on the Schoolserver page.

Note: the numbers of machines supported in each network configuration are in flux at the moment. You will need to experiment with the technology a little. Look for documentation from other teams to help you.

Please consider the minimum connectivity requirements in the table below when making your deployment plans.

<20	<40	<80	<120	>120
no server needed, but functionality useful	server + 1 access point (or active antenna)	server + 2 access points (or 2 active antenna)	server + 3 access points (or 3 active antennae)	server + many access points

A number of computers may act as a school server, but it must be a Fedora-capable computer. Recommended minimum specifications for a school server are as follows:

Server	Laptops Supported	Processor	RAM	Storage
Small	<20-25	466 MHz	256 MB	40-60 GB
Large	<150	1 GHz	1 GB	320-400 GB

Next Section: Teacher Preparation/Student Facilitation

8. Teacher preparation/ student facilitation

Learning workshops

OLPC runs monthly week-long learning workshops where we introduce the learning model behind the laptop experience. We urge you to send teachers, administrators, and technical-support personnel to one of our workshops early in the deployment planning process. OLPC will also help in-country teams develop workshops that are facilitated by in-country teams for training-the-trainers and more wide-scale teacher preparation.

The goal of the both OLPC and in-country learning workshops are to strengthen local deployment teams so as to maximize learning. Attendees should have a focus on learning; administering and implementing a 1-to-1 laptop initiative; working with children; working with teachers, schools, and communities; developing activities and content, or other similar educational issues.

Workshop content and activities vary based on the needs and experience of the participants. However, the basic approach/methodology and some content are common to all workshops.

- They are hands on—we expect teachers as well as students to "learn through doing".
- They include a discussion of the "Constructionist" theories of learning pioneered by Seymour Papert more than 40-years ago as well as a discussion of how to augment and enhance existing curricula, educational goals, and evaluation with the laptop.
- They emphasize community building and a discussion of how to involve parents in the learning process
- and, often, they culminate in a "fair", where participants share their accomplishments with each other in a manner similar to a science fair.

Some involvement by students and teachers who have previously been using the laptops is always a plus. The OLPC Learning Team has a wealth of experience and examples to share from previous deployments and interventions. Finally, everyone should take the time to disassemble a laptop, just to prove to themselves that it really is that easy.

The primary objectives of learning workshops are:

- a progressive deepening of understanding of the learning process;
- how the XO laptop enables more effective learning through construction, expression, and collaboration;
- the roles of technology in general and one-to-one environments in particular;
- the pragmatics of children, laptops, and learning;
- plans for successful deployment at scale (i.e., a discussion of the contents of this document);
- development of and participation in an international network of practitioners of 1:1 environments.

Topics to be covered:

- learning and child development
- computers and learning
- building teams for successful deployment
- experiences to date in 1:1 laptop deployment
- curriculum, content and materials in 1-to-1 environments
- teacher development
- collaboration and learning networks
- local creation of materials
- saturation models of laptop deployment
- growing to large-scale high-impact
- project-based learning
- constructionism and constructivism
- using public media to build support and awareness
- community-based activities
- leveraging the university, NGO, and free software communities

Teacher preparation

The most important aspect of teacher preparation is in regard to how children learn. Educators have long recognized that children learn best when they are active, when they pursue their own interests, and when they participate in cultures of knowledge and engagement. With 1-to-1 access to connected laptops, children actively engage in knowledge construction and are not limited to passive reception of information. Each child (and the teachers themselves) can pursue learning in areas of strong personal interest and the classroom is not limited to a pre-determined, one-size-fits-all approach. (A series of short articles by MIT Professor Marvin Minsky that are published in the OLPC wiki drive home this point.)

Teachers benefit as well. Not only do they get to use the laptops at home for their own learning, but the connected laptop becomes a conduit for customized professional development. This enables the teachers to gain access to expertise and colleagues and allows them to pose and respond to practical questions.

Children (and teachers) can participate in the study of global issues while simultaneously using local context for understanding. They can fully participate as producers of knowledge and not just as consumers of materials produced by others.

Nepal's teacher preparation program is one possible point of reference. There are a number of teacher preparation documents here.

A guide to the Peru (in Spanish) deployment can be found here.

A teachers preparation workshop that was deployed in Pakistan can be found here

Community preparation

Both nationally and locally, the community needs to know what one laptop per child means—the children are your best ambassadors, but engage parents and community leaders as well.

Note from Oceania

We hold a separate session with parents and leaders in the community covering such topics as:

- Parents responsibility in looking after the laptop and supporting their children's learning with the laptop;
- Establishing rules for sharing the laptops at home and asking the child if the laptop can be shared;
- Looking out for bullying involving the laptop, especially from older siblings and children;
- Safely charging the laptop (this is important with mains power and young children);
- Learning about the laptop and Internet from children;
- Making sure the child takes the laptop, fully charged, to school.
- We also ask parents to sign a simple agreement covering the above points.

Evaluation

It should involve the whole child: Prior 1-to-1 laptop experiences have demonstrated tremendous gains in learning, more time spent on schoolwork, development of technological fluency, and a stronger sense of inclusion among the students. Not only do children go far beyond standard curricula, but also they learned to care, talk, share, explore, and teach.

Next Section: Support

9. Support

OLPC, the community, and the in-country deployment teams have been developing a number of support materials in the form of manuals, guides, etc. that can be readily shared and modified. We also have very active electronic forums: wikis, chat rooms, email lists, even call centers. Establishing redundant channels of communication is critical to closing the loop on feedback and establishing a sense of community for the teachers who are “on the front lines.” Wherever possible, be public about what you learn so that the knowledge spread and you get feedback.

Support resources should include:

(a) Those who go through formal training (regional support);
(b) Your in-country team (national support);
(c) OLPC support community (international support);
(d) Local university (and/or secondary school) students;
(e) Grassroots organizations—there is tremendous interest and good will (take advantage of it, but don't try to control it);
(f) Peer-to-peer support (local support: teachers helping teachers, children helping children, children helping teachers, etc.);
(g) Other—including the diaspora community, the global Free and Open Source community, etc.

See Nepal: Support Training for an example training program for support technicians

Next Section: Service/Repairs

10. Service and Repair

Laptops are shipped with an overstock of 1% of the order. These "extra" laptops should be used as replacements for failures in the field. To date, the vast majority of failures have involved problems with either the touchpad or keyboard. Thus the "broken" laptops are a ready supply of spare parts for other components, such as the display, the wifi antennae, and the motherboard. Most repairs, including replacement of the motherboard can be done in the field with just a screwdriver. The children can make these repairs themselves and are encouraged to do so by OLPC. Regional distribution of spare parts is something to consider, as well as the authorization of regional repair centers.

While commercial-grade support could be arranged, it is discouraged by OLPC both because it tends to raise costs and it adds a level of external dependency that is unnecessary. If you feel the need to invest in support, we encourage you to make that investment locally: the local community really can do this themselves.

Most parts are inexpensive and easy to replace.

Give One Get One donor communities in the developed world have been working on a number of community repair centers. The volunteers running these repair centers have produced some training materials about common repair tasks and represent a potential resource for assistance with establishing similar repair centers in deployment areas.

Next Section: Internet safety training

11. Internet safety training

Like most things in life, there are good and bad elements of the Internet. Considering that we are introducing many children, we have a responsibility to introduce internet safety as part of OLPC deployments.

There are many Internet-safety programs that have been developed around the world; most likely, there is one in your own country. These programs are open developed in collaboration with local authorities such as police, church groups, and industry groups.

One program that has won international awards is Netsafe in New Zealand. (Please add links to additional programs on the Talk:Deployment_Guide/Internet_Safety_training discussion page.)

A sustainable cyber-safety program typically has four elements: technology, policy, education, and support.

Technology

Content filtering, while of limited utility, can protect children from exposure to harmful content. (Rules for the filters can be set to match local cultural norms.) Many new users of email may fall for basic scams; it is worth employing content and SPAM filters. Material on anti-virus and malware protection are also relevant technologies. (For Linux-based systems, see the Bitfrost specification for a discussion built-in security model.)

Policy/regulation

This is an interesting challenge. The work that has gone into updating laws to consider the impact of technology is incredible. Many nations might not have the appropriate legal capacity and infrastructure for a digital age. The project will provide a summary document that outlines all the areas technology challenges the legal system – so that they can review their own laws.

Education

The program will consider the formal and informal aspects of education on cyber safety. Formal educational materials can be delivered through schools; informal educational materials can be delivered through the media, presentations to parent groups, etc. The formal material may be structured around a Cyber-citizenship Pathway. There will be lessons designed to engage young people to develop their own understanding of the environment – rather than project ours onto them. The aim is that they will come to a similar conclusion to us – but the learning is much more powerful. All this material will be available on the web – so it will be available to anybody. Some localization to fit local issues and cultures will be possible. There will be training for the people who are going to deliver it to ensure it was fully understood and delivered as well as possible.

Support

When issues arise, who do the users turn to for advice, assistance, and support? (In New Zealand, this is NetSafe, but who do you call if you've been scammed, cyber-bullied, etc. other nations?) In each country, a resource must be identified and systems set up and promoted to the population. The program will assist the development of appropriate support systems.

Next Section: End of life planning

12. End of life planning

We are all conscious of the environment and any laptop rollout program should also include an "end of life" plan. ie, what do we do with the laptops when they begin to fail after 5 or more years.

Although the laptop is environmentally more friendly than any other laptop, we still do not want to see them filling up landfills or littering the streets.

Suggestions include a bounty for return or even a replacement laptop (assuming that by then, the laptop will cost only US $75)

Local stripping down and recovery/recycling of valuable material should be considered.

Next Section: Deployment tips

ANNEXES

I. Simple Deployment Tips, Ideas, and Experiences

- Provide activation codes and procedures in timely fashion to the deployment sites—at least 24 hours before the laptops are scheduled to arrive at the destination.
- Use a spreadsheet to properly calculate the number of servers, antennas, access points, switches, meters of UTP Cat5 cable, crimping tools for 8-Pos. RJ45 plugs, connector (Cat5-RJ45), etc.
- Most enterprise access points will work fine because they allow for fine control of WDS. It is recommended that you test any access points you plan to deploy before you go out into the field. See the http://wiki.laptop.org/go/Wireless_Access_Point_Compatibility webpage for appropriate access points.
- Document a procedure that is easy to follow regarding how to set up and design the internal network infrastructure.
- XO laptops should not be deployed to places without a primary source of electricity, unless there is provision for alternative power sources.
- Proper selection of the initial schools in the deployment is of key importance: always adhere to OLPC's principles of a focus on younger children and community saturation.
- A support team (with specific individuals identified for software, content, connectivity, and logistics) should be assembled in advance.
- A professional interpreter (if required) should be available throughout the implementation for the teacher and feedback sessions, infrastructure setup, etc.
- The teacher-preparation sessions have to be adapted day-by-day, depending on the group dynamics, their concerns, their understanding of the OLPC "Learning Approach".
- A toolkit should be brought with the implementer, though acquisition of local tools and supplies is encouraged. The toolkit should include a soldering iron, screwdriver, solder, pliers, wire cutters, electrical tape, sensors, wires, USB connectors, and a multimeter.
- For the technical session with volunteer teachers, parents and community members, have a magnetized screwdriver per participant, otherwise one screwdriver for two people to share.
- Having the software and the keyboard in the local language adds to the comfort-level of the community.
- The fewer servers to be installed per school the better, since usually they have to be placed in secure places and proper environments (not too humid, not too hot,...); finding one secure place may be feasible, but the greater the number of servers, the greater the complexity of the situation in some schools.
- The mesh should ideally reach every corner of the school, from classrooms, to gym, to patios, to cafeteria, to teachers' rooms, etc.

- It is a must to have a dedicated, willing and capable country team taking the lead of the project. The more they take over and the sooner they do it, the better.
- The country team should understand the complexity of the OLPC project in order to implement it within the local context and therefore should be able to resolve the detailed challenges, which include detailed distribution plan, power and network setup, security strategy, content requirements, media strategy, Constructionist Learning approach.
- Local customs, beliefs and ways of doing things should be incorporated within the implementation and the foreign implementors should be adaptive and aware of them.
- The electrical set up of the schools has to be evaluated according to the demand of power that will be required to power the XO laptops, servers, and other devices. If it is not the proper one, then it has to be fixed.
- The Internet connection should be as fast as possible, considering long-term affordability.
- Upgrades must be as transparent as possible for the users.
- The power adapters for the laptops should be the proper ones for the country.
- Prior to the laptop arrivals, a technical team (or person) should be responsible for evaluating, setting up, testing and vouching for the network and power infrastructure.
- Open communication with the country team and OLPC is essential to plan realistic implementations within the specified time frames.
- Testing of the mesh and Internet connectivity through the OLPC server set up should be performed with different numbers of XO laptops: if we have a limited number, then schools should be chosen accordingly.
- All the people involved in the OLPC country deployment should provide feedback to the team for improvements daily or every other day.
- OLPC should point in-country teams towards possible sources of content and empower them to create and adapt their own content.
- A deployment principle to always keep in mind is long-term self-sufficiency within the schools and the country.
- Set up a maintenance structure starting from the schools to specialized support and procedures, so the children can have their laptops with them as long as possible.
- Technical know-how should be passed on to school and country teams through a Constructionist Learning approach.

Next Section: Deployment checklist

II. Check lists

Activity	Owner	Status/Next Steps
Team/Organization		
Establish GO or NGO		
Board of Directors/Advisors		
Ministry of Education/Government Liaison		
OLPC Liaison		
Tech Lead		
Pedagogical Lead		
Logistics Lead		
Community/Volunteer Liaison		
School Census		
How many children?		
How many teachers?		
How many administrators?		
Power?		
Internet?		
Other infrastructure?		
Other issues, such as constraints on access (e.g., travel time to school from regional distribution center)		
Principle languages spoken in the community		
Locally available resources?		
Physical security at school		
Finances/Logistics		
Identify funding sources		
Letter of credit		
Product availability		
Shipping method		
Incoterms (e.g., CIF)		
Import duties and taxes		
Local distribution contract		

Factory's shipping schedule (how many, how often)		
Type of shipping container used (20 ft/40 ft?)		
Reverse logistics process (for laptops that malfunction)		
Inventory Management		
Activation-key management		
Warehousing		
Regional distribution centers		
Scanning process (e.g., comma-separated-values file generation)		
Shipping instructions (School addresses, bar codes, etc)		
Additional shipping material (boxes, masking tape, markers, highlighters, etc)		
Communications		
Network backbone		
Network installation		
Potential partners		
Content filtering		
Network maintenance		
Content		
Transcoding of existing content		
Generation of new content		
Translations		
Localization (OS image in local language / set to local timezone)		
Determination of which activities and their order on the task bar		
Guides in local language		
Guides loaded to the XO		
Hardware		
Laptops		
Keyboard selection/design		
Power adapter selection		
Spare-parts inventory		
Servers		
Active antennae/Access points		
Auxiliary-power options		
Repeaters		
Power cords		

Repair kits		
USB memory sticks		
Connectivity equipment (e.g., routers, modems, VSAT)		
Cabling		
UPS		
Teacher Preparation		
Workshop plan		
Workshop schedule		
Workshop logistics		
Workshop attendee list		
Workshop site preparation		
Workshop material preparation		
Support		
Support plan		
3rd party support plan (if applicable)		
Localized documentation and support materials		
University relations?		
Grassroots relations?		
Mailing lists/Wiki/IRC		
Team(s) of volunteers with XO knowledge in country/region		
Team(s) of volunteers that can help with translations (from/to English)		
Other non-profit organizations		
Other public institutions (universities, ministries, churches)		
Other private institutions (universities, industry)		
International organizations (World Bank, etc.)		
Project Documentation		
Project charter		
Deployment plan (time-line for project completion)		
Distribution plan (How many laptops by region, by school, by school district?)		
Contact information (names, email addresses, phone numbers, etc.)		
Communication plan (conference-call schedule / bridge info., moderator, agendas)		

Next Section: [Sample deployment schedule]

III. Sample Deployment Schedule

	Activity	Owner	Status/Next Steps
Preparation	Assemble team		
	Define budget		
	Define any unique deployment requirements		
	Initial training sessions at OLPC		
	Census		
	Site survey		
	Homologation, certification process		
Day 0	Purchase order/Letter of credit issued		
	Laptops ordered		
	Servers, active antennae, power and connectivity equipment ordered		
	Localization/translation begins		
	Connectivity planning begins		
	Pedagogical planning begins		
	Community outreach begins		
	Content planning begins		
Day 30	Keyboard design delivered to factory		
	Training manuals completed		
	Local technical training begins		
	Site preparation begins		
Day 60	Teacher preparation begins		
Day 90	Laptops delivered ex works		
	Country software “image” completed		
	Country content “image” completed (ebooks, etc.)		
	Order of activities on tool bar completed		
	Software QA begins		
Day 120	Laptops arrive in country		
Day 125	Laptops clear customs		
	Inventory begins (including scanning process);		
	Software update begins		
	Activation keys generated		
Day 135	Regional distribution begins		
Day 150	Laptops begin arriving at schools		
	IT infrastructure completed		
	Activation process performed at schools		

	Laptops distributed to teachers and children		

Next Section: [Sample workshop schedule]

IV. Sample Workshop Schedule

The workshop should work according to the same principles we advocate: we will learn by doing, by constructing, by collaborating, by reflecting. We will build upon the interests of the participants and take advantage of work, ideas, and questions of the participants. Thus, one should view the following agenda as the schedule from which we will opportunistically deviate.

	Topic/Activity	**Goal**
Day 1	Welcome and introduction Overview of the workshop Introductions by participants Talk and discussion: laptops and learning: What's different? Hands-on experience #1: the basics Discussion of major issues Children, learning, and computers	Introduction to pedagogical concepts behind one laptop per child and achieving an initial level of comfort with the laptop; ask the participants to use the laptop to take notes throughout the workshop!
Day 2	Constructionist 1:1 learning experiences Talk and discussion: OLPC in countries: What we have learned so far Hands-on experience #2: activity exploration	Learning from the experiences of others; deeper immersion into the tools: e.g., the Journal, Turtle Art, Etoys, and/or Scratch
Day 3	Materials for 1:1 learning Hands-on experience #3: collaborating Questions and answers: technical Questions and answers: logistical Questions and answers: pedagogical Power and connectivity Talk and discussion: community and children as teachers and learners	Introduction to networking and the mesh; sharing and collaborating; disassemble and reassemble a laptop
Day 4	Talk and discussion: assessment and metrics Key deployment issues: local teams and teacher development Deployment plans	Integration of 1-to-1 computing to curricula; going beyond the status quo
Day 5	“Open House” Feedback Talk and discussion: next steps	Participants provide feedback to each other about what they have experienced and learned

V. Glossary

Hardware

XO laptop
: a flexible, ultra low-cost, power-efficient, and durable laptop computer designed by OLPC; features include mesh networking and a sun-light readable display

XS school server
: the school server extends the storage and computation provided by each laptop, as well as providing a local library and a mesh portal to the Internet.

Networking

mesh network
: A wireless mesh network is a communications network made up of radio nodes in which nodes can forward information on behalf of each other so that even nodes that are not in direct radio contact can communicate via nodes that are between them. The collective coverage area of the radio nodes working as a single network becomes a mesh cloud.

infrastructure mode
: network connectivity through a WiFi access point, e.g., 802.11b/g

mesh mode
: network connectivity through a mesh network, e.g., 802.11s

simple mesh mode
: a mesh network that is running between laptops without a School Server

school server mesh mode
: a mesh network that is mediated by a School Server

presence
: a discovery service for finding other laptops on the network

jabber
: a protocol that the laptop uses for collaboration

tubes
: a protocol for passing data between laptops

mesh channel
: the laptops use three channels for communication: 1, 6, and 11; in simple mesh mode, the laptops can only see other laptops on the same channel; in a School Server mesh, laptops on all channels are visible

access point (AP)
: an AP is a device that connects wireless communication devices together to form a wireless network. The AP usually connects to a wired network and can relay data between wireless devices and wired devices. Several APs can link together to form a larger network.

mesh portal point
: a mesh node that serves as a gateway (portal) to a network external to the mesh

Operating system and firmware

operating system (OS)
: The low-level system that manages the various files, processes, etc. needed to operate the laptop; the OS used by the XO laptop is the RedHat Fedora distribution of Linux.

build

a specific instance of the operating system, designated by category and number; e.g., Ship.2-656; Update.1-698; Joyride-1792

reflash

the process by which a fresh build is installed in the laptop; reflashing overwrites all files, including files in /home/olpc, so it should be done with caution

update (olpc-update)

the process by which incremental changes to a build are installed on the laptop;

system firmware

The system firmware is made up of 2 parts: The EC and OFW. The first part is the software that runs the embedded controller (EC). The EC handles the processing of the keyboard, touchpad, game buttons, power button, and charging the battery. The second part is OpenFirmware (OFW). OFW is responsible for initializing the hardware and booting the operating system. OFW also handles boot security so that it will only load "official" OLPC operating systems.

wireless firmware

The wireless firmware is software that controls the operation of the wireless radio. It is downloaded into the wireless radio by the operating system.

suspend

{exact definition needed} In general, to make the XO go into a standby (or power down?) state.

resume

{exact definition needed} In general, to make the XO go back into normal operatiaon from a standby (or power down?) state.

Internal storage

NAND flash

the 1G internal storage used in the laptop

SPI flash

internal storage used by the embedded controller

datastore

component that manages the access to the data displayed in the Journal; these data are stored in individual files; an index that contains the metadata and speeds up searches

External storage

jumpdrive/thumb drive/USB drive/USB stick/memory stick

A small, external storage device that plugs into one of the USB ports on a computer. They can store between 16MB (enough to hold several music files) up to 4GB (enough to hold several high quality full-length movie files) and a wide range in between. Jump drives are easily purchased at any electronic store starting as low as $5 to $10. The XO laptop has three USB slots.

SD card

Secure Digital (SD) is a flash (non-volatile) memory card format used in portable devices, including digital cameras, handheld computers, PDAs, and mobile phones. SD card capacities range from 8 MB to 32 GB. The XO laptop has one SD slot.

User Interface (UI)

Sugar UI

the user interface of the laptop is called "Sugar"; it consists of four views, the Frame, and the Journal

home view

a view of what activities you are running and other status information—home view is the starting view on the laptop;

group view

a view of your friends with whom you are working on shared projects;

neighborhood view
a view of who is on the network with you and what activities and content are being shared;

activity view
a view used by the current activity that is running on the laptop

frame
the Frame, which can appear in any view, holds a clipboard, the task bar (for starting activities), navigation controls, and list of "buddies" (collaborators);

journal
a special activity where you can see your previous work done in other activities. You can also resume the work done at those activities;

toolbox
an user-interface element that appears in the top part of most activities and contains one or more toolbars

toolbar
an user-interface element that can contains several buttons, text entry fields, drop-down menus, etc. that is usually contained in a toolbox; common examples of toolbars include: Activity, View, Edit, et al.

palette
a black box that appears when the mouse hovers over an object; a palette can contain the name of the control, some details about it or some related actions

Activities and Content

activity
an application that has an icon in the taskbar, e.g., Write, Record, Browse; Activities engage you in taking a picture, reading a book, creating a page, annotating a page, animating a drawing, making sounds and music, measuring and sensing, sharing your favorites, inviting your friends, surfing on the web, etc...

content
books, music, movies, photographs, drawings, etc. that are created on the laptop or downloaded to the laptop

content library
content that is created on the laptop is accessed through the Journal; preloaded content is stored in a library and is accessed through the Browse activity

bundle/activity bundle
a "zip" file with a .xo suffix used to package and distribute activities; bundles are installed in /home/olpc/Activities

content bundle/collection
a "zip" file with a .xol suffix used to package and distribute content; bundles are installed in /home/olpc/Library

Power Options

human power
energy generated by people, typically through mechanical means, such as a hand crank, pedal, or pulley system

solar power
energy generated by the sun, either in the form of a 5–10 watt panel to power an individual laptop or a 150–300 watt panel to power a multibattery charger or school server

multi-battery charger
a prototype classroom device used to charge 12–15 batteries at one time

power adapter
each laptop comes with a power adapter to allow it to be plugged into a power socket

XoctoPlug
a prototype classroom device used to power up to 8 laptops without the use of individual power adapters

Security

BitFrost
the OLPC security platform.

Rainbow
Rainbow implements the isolation shell implicitly described in the Bitfrost security specification. This means that it isolates activities (and eventually system services) that it is asked to run from one another and the rest of the system.

key
a piece of information saved as a file or sent as data and used in cryptographic algorithms, such as digital signature schemes and message authentication codes.

activation
In order to use your laptop for the first time (or after a “reflash” of the operating system), it must be unlocked by an activation key.

activation key
The key that unlocks the laptop

developer key
If the boot firmware sees a developer key, it makes the XO laptop work just like any ordinary PC-style laptop, in the sense that it will let you interrupt the boot process and enter commands; and it will try to boot and run any program you supply to it, no matter whether the OLPC organization has tested or signed it. (The laptop also works this way if its firmware security is disabled.)

signed/unsigned builds
OLPC produces both "signed" and "unsigned" builds of the operating system. Signed builds are release builds that have undergone QA testing. Unsigned builds are development builds, which are used for testing new features and bug fixes. You cannot run an unsigned build in your laptop unless you have either a developer key or security has been turned off (as in the case of the G1G1 laptops).

key generation
The process of generating both activation and developer keys

lease
When a laptop is activated, the activation has an expiration date. The period between activation and expiration is the lease period. The lease period is determined during the key-generation process; the laptop can be reactivated after the lease has expired.

passive kill
currently unsupported, this is a mechanism that uses the lease mechanism to require laptops to periodically ask for a renewed activation. Without the renewal, the lease will expire and the laptop will be locked.

active kill
currently unsupported, this is a mechanism whereby a laptop that has been reported stolen can be remotely shut down when it connects to the Internet.

malware
Malware is software designed to infiltrate or damage a computer system without the owner's informed consent. Linux is relatively robust in light of malware and Rainbow provides additional protections above and beyond the standard Linux defaults.

computer virus

a computer program that can copy itself and infect a computer without permission or knowledge of the user, a type of malware.

Documentation and Support

Wiki
a collaborative website that allows for community contributions and editing, e.g., http://wiki.laptop.org

IRC/chat (Internet Relay Chat)
real-time text chat used by the development and technical support communities (and hopefully the learning community as well)

email list
a collection of email addresses—an efficient way to send email to a group of people who share an interest

RT (Request Tracker)
Web site: http://rt.laptop.org/ This is a Help ticket tracking system. Read http://bestpractical.com/rt/ for more.

Localization

Pootle (PO-based Online Translation Engine)
a server that is used to store and manage translation templates and files

POT file
the master translation template for a project

PO file
a file containing the instance of translated strings for a single language based upon a POT file

Next Section: Worksheet for planning deployment needs on an individual school basis

VI. Deployment Guide/Workbook

This is a workbook for estimating the cost of a large-scale deployment of One Laptop Per Child. It is a working document that reflects lessons learned from initial pilots and deployments. Additional ideas will be incorporated as we learn from each other. The latest version is available in Microsoft Excel format: Deployment_Workbook.xls

VII. Pricing worksheet (per school)

item	quantity	unit price	total cost
per child			
laptops	1		
solar panels			
per classroom			
power strips			
spare power adapters			
multi-battery charger			
per school			
XS server	1		
active antennae			
access points			
cabling			
power supply			
physical security			
connectivity			
modem			
dish/antennae/etc.			
startup costs			
installation			
teacher preparation			
shipping			
recurring costs			
laptops for new students			
connectivity cost			
energy costs			
maintenance costs			
periodic equipment refreshes			

OLPC Oceania Technical Working Group

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